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**Chen et al.**

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(54) **METHOD OF MANUFACTURING PACKAGE COMPONENT FOR LIGHT EMITTING DIODE AND PACKAGE STRUCTURE THEREOF**

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(73) Assignee: **GENESIS PHOTONICS INC.**, Tainan (TW)

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(30) **Foreign Application Priority Data**

Oct. 9, 2013 (TW) ..... 102136507 A

(51) **Int. Cl.**

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|---|---|
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| ***H01L 33/50*** | (2010.01) |
| ***H01L 33/00*** | (2010.01) |
| ***H01L 33/48*** | (2010.01) |
| ***H01L 33/54*** | (2010.01) |
| ***H01L 33/56*** | (2010.01) |
| *H01L 31/0203* | (2014.01) |
| *H01L 51/52* | (2006.01) |
| *F21K 99/00* | (2010.01) |

(52) **U.S. Cl.**

CPC ..... ***H01L 33/52*** (2013.01); ***H01L 33/005*** (2013.01); ***H01L 33/48*** (2013.01); ***H01L 33/483*** (2013.01); ***H01L 33/50*** (2013.01); ***H01L 33/501*** (2013.01); ***H01L 33/505*** (2013.01); ***H01L 33/54*** (2013.01); ***H01L 33/56*** (2013.01); *F21K 9/90* (2013.01); *H01L 31/0203* (2013.01); *H01L 51/5237* (2013.01)

(58) **Field of Classification Search**

CPC ..... H01L 33/005; H01L 33/48; H01L 33/483; H01L 33/50; H01L 33/501; H01L 33/52; H01L 33/54; H01L 33/56; H01L 31/0203; H01L 51/5237; F21K 9/90

See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

2010/0193821 A1* 8/2010 Fukasawa et al. ..... 257/98

* cited by examiner

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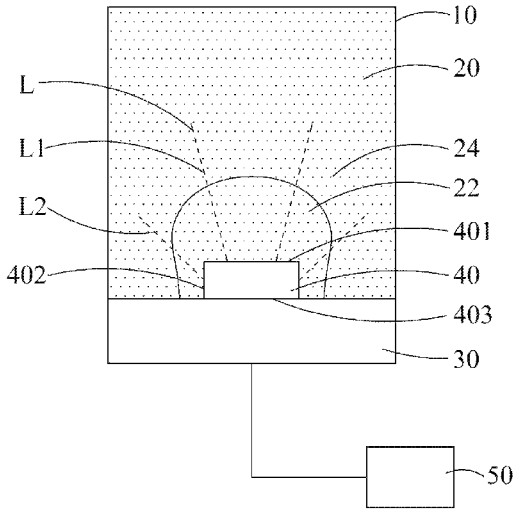
(74) *Attorney, Agent, or Firm* — Muncy, Geissler, Olds & Lowe, P.C.

(57) **ABSTRACT**

A method of manufacturing package component for light emitting diode (LED) is disclosed. At least one LED is disposed on a substrate inside a photocuring resin, wherein the LED is covered completely by the substrate and the photocuring resin. Power is provided to the LED to make the LED emit plural light beams such that a portion of the photocuring resin is cured by the light beams to obtain a male mold. A separation process is performed to separate the male mold and the other portion of the photocuring resin, the LED and the substrate. A rollover process is performed to manufacture the female mold by the male mold, wherein the female mold has at least one accommodation space with a shape identical to that of the male mold. A forming process is performed to form a package component with a shape identical to that of the male mold.

**14 Claims, 11 Drawing Sheets**



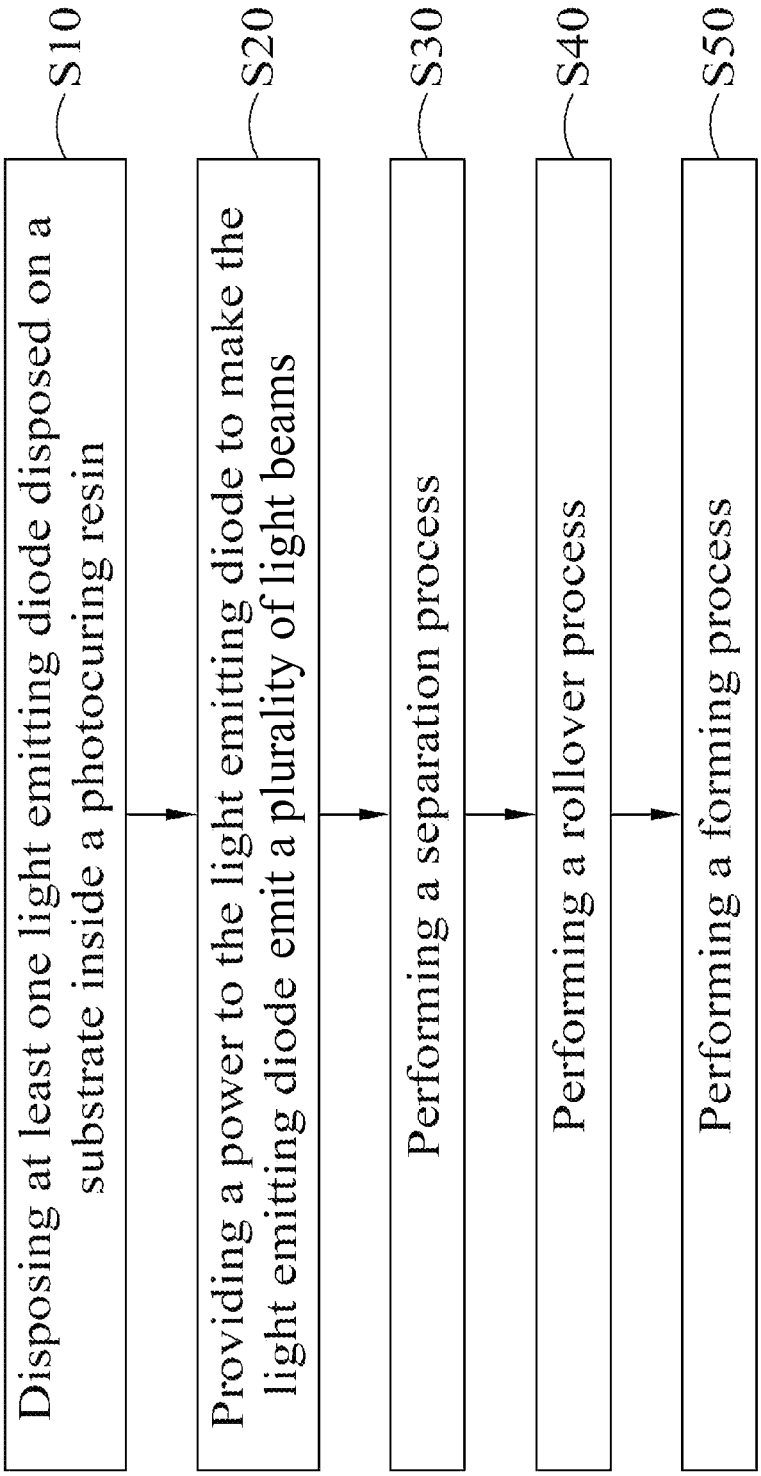

S10
Disposing at least one light emitting diode disposed on a substrate inside a photocuring resin
S20
Providing a power to the light emitting diode to make the light emitting diode emit a plurality of light beams
S30
Performing a separation process
S40
Performing a rollover process
S50
Performing a forming process

FIG. 1

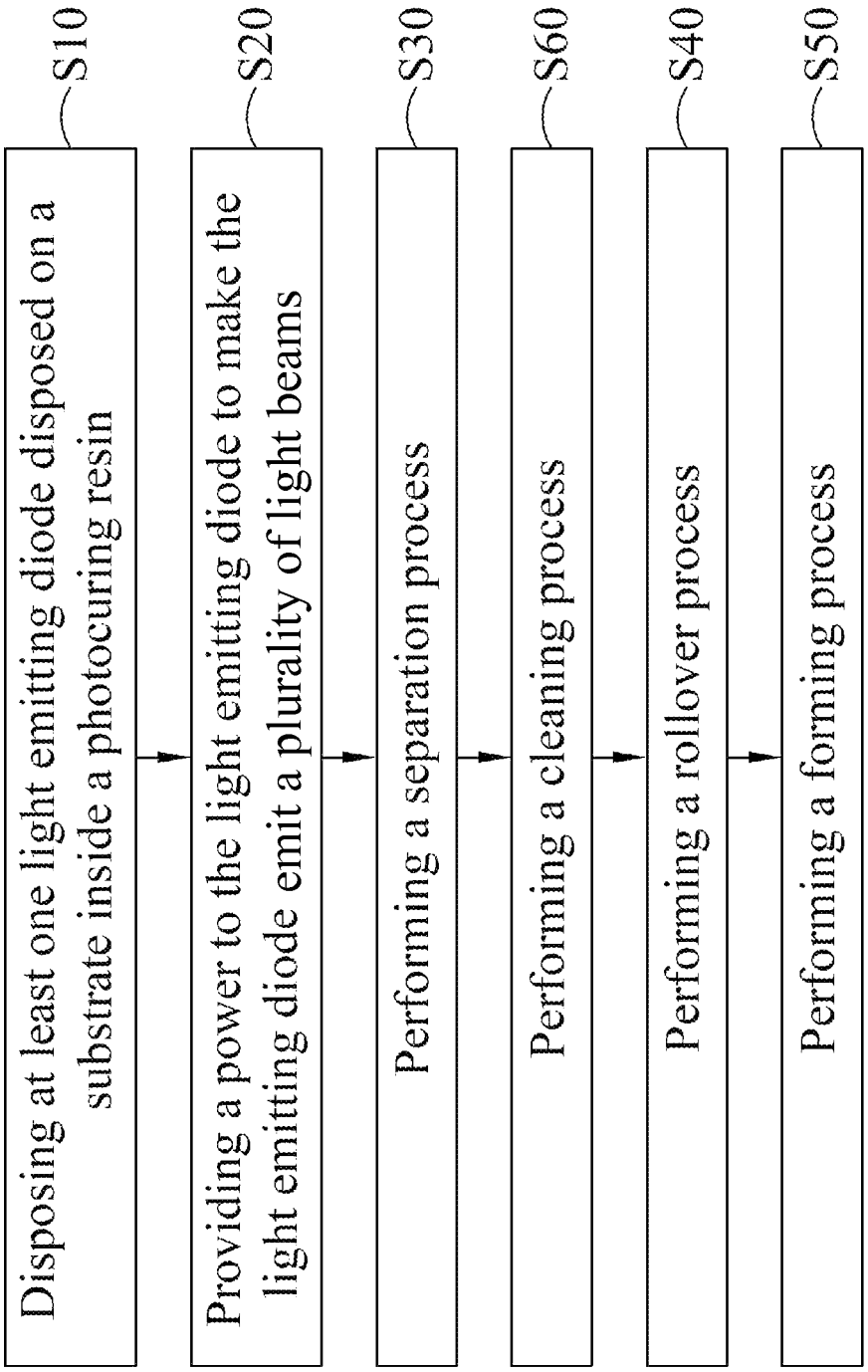

S10
Disposing at least one light emitting diode disposed on a substrate inside a photocuring resin
S20
Providing a power to the light emitting diode to make the light emitting diode emit a plurality of light beams
S30
Performing a separation process
S60
Performing a cleaning process
S40
Performing a rollover process
S50
Performing a forming process

FIG. 2

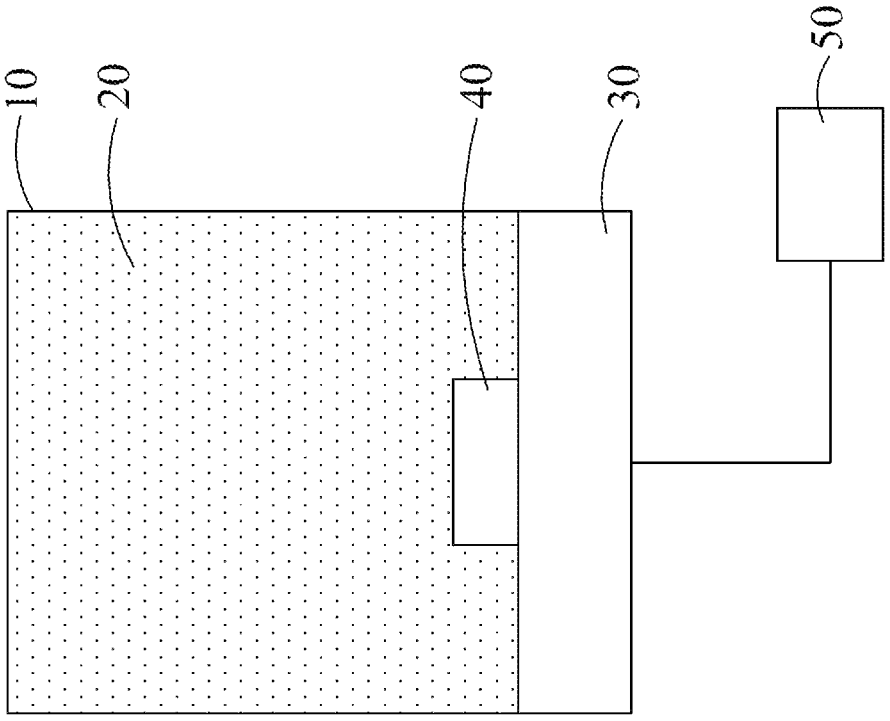



FIG. 3

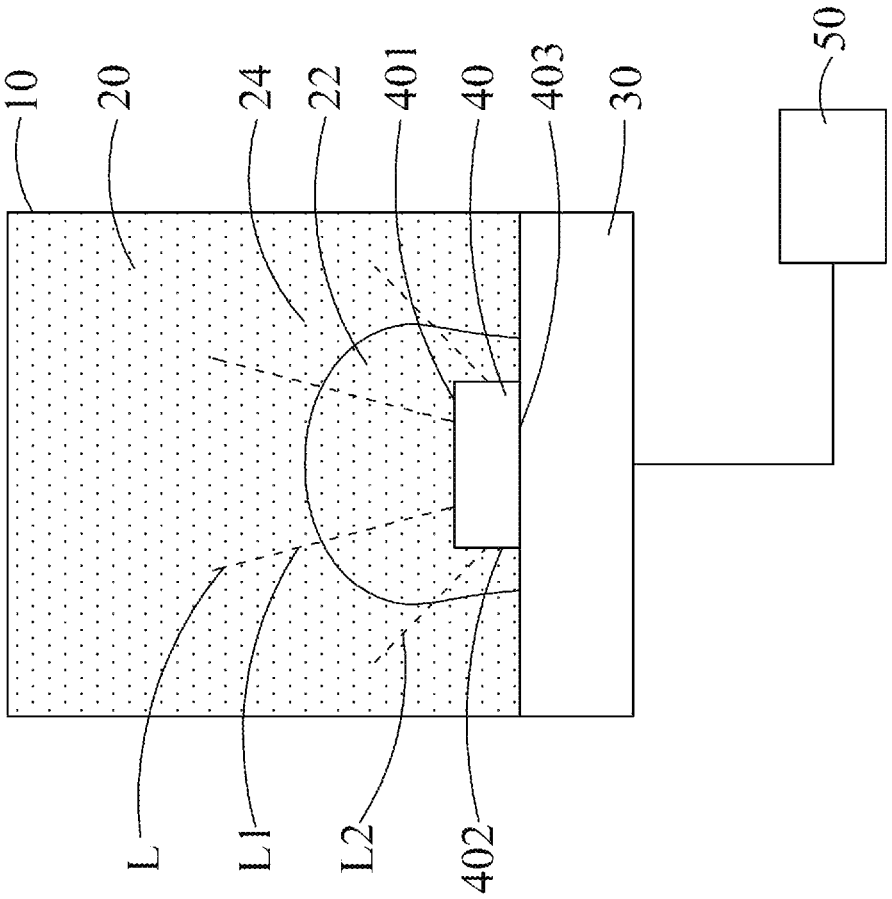



FIG. 4

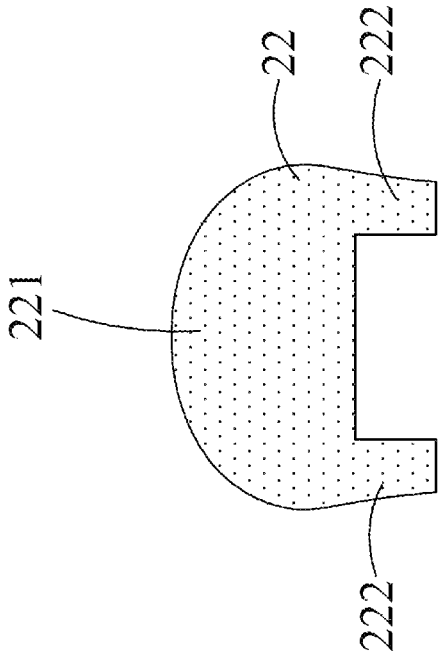



FIG. 5

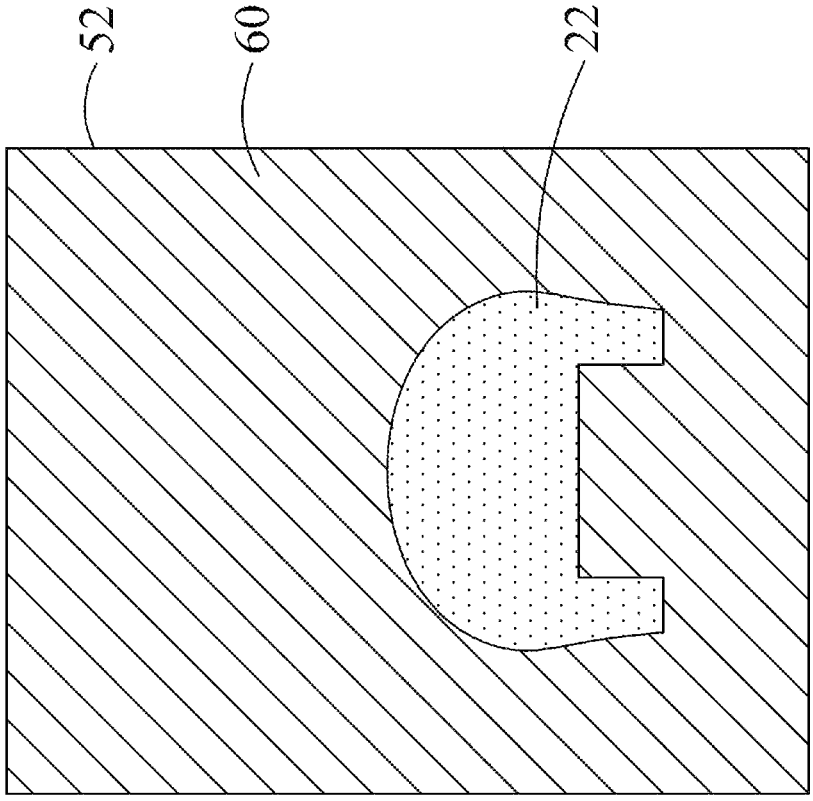



FIG. 6

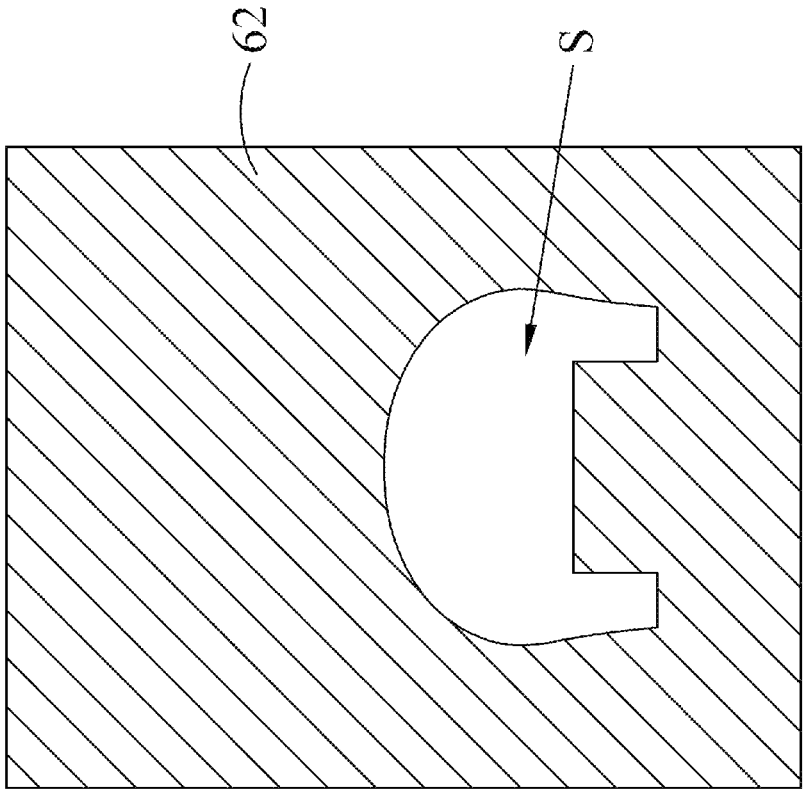



FIG. 7

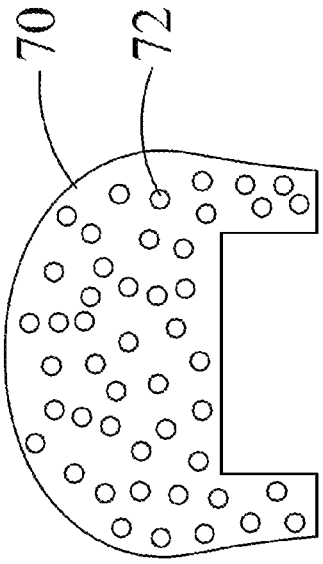



FIG. 8

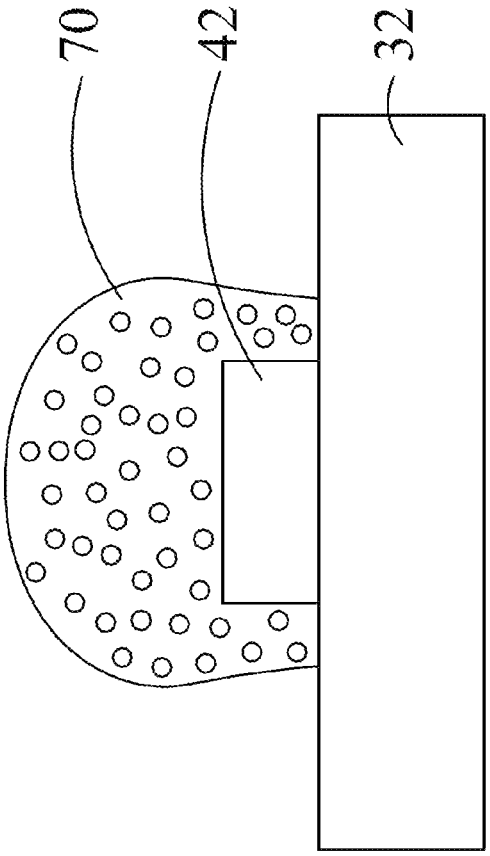



FIG. 9

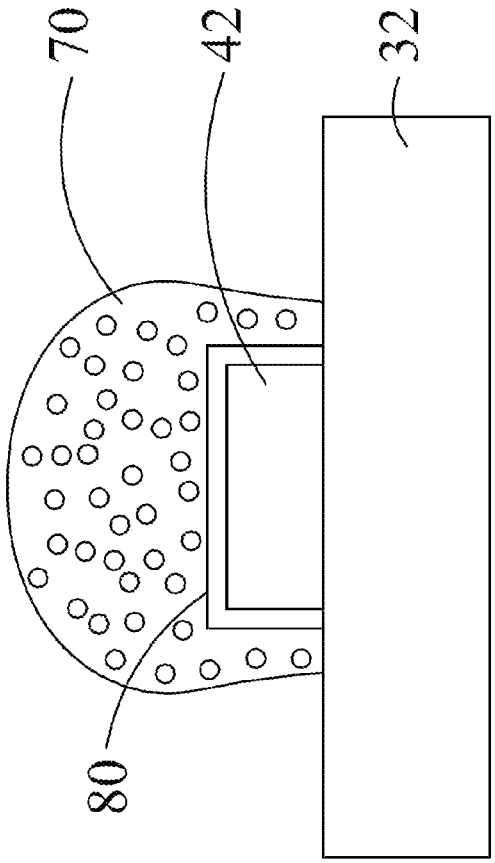



FIG. 10

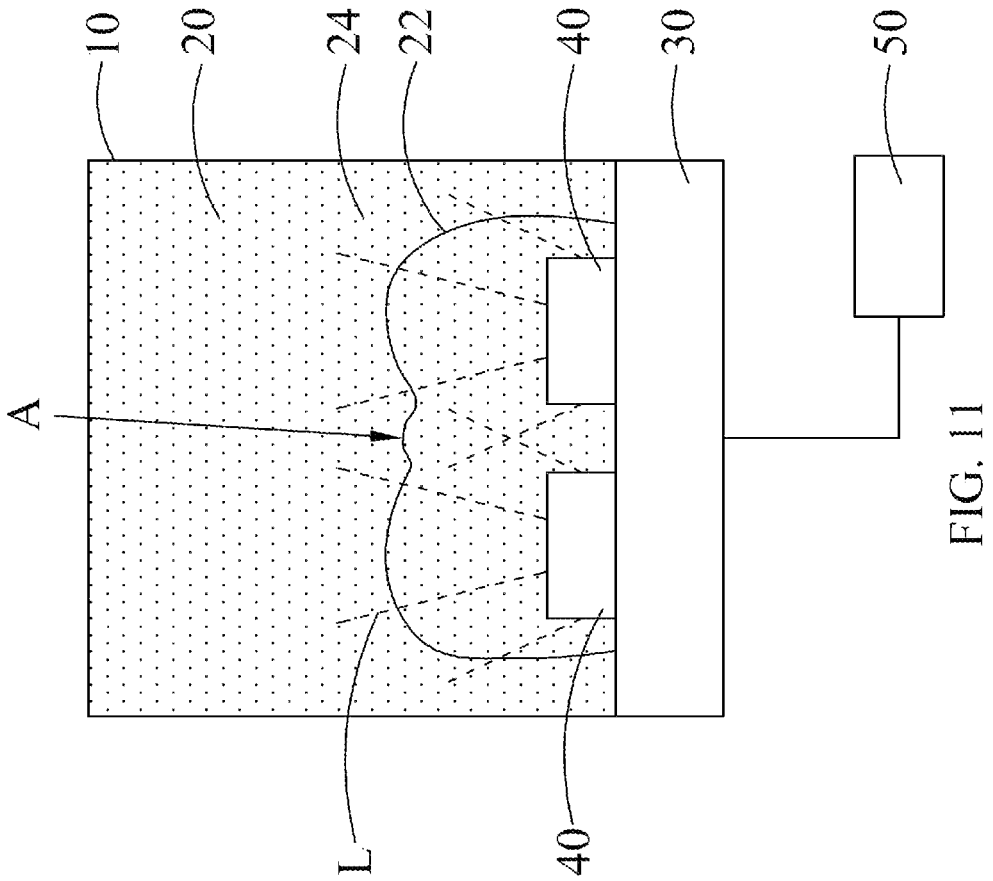



FIG. 11

# METHOD OF MANUFACTURING PACKAGE COMPONENT FOR LIGHT EMITTING DIODE AND PACKAGE STRUCTURE THEREOF

## CROSS-REFERENCE TO RELATED APPLICATION

This application claims priority from Taiwan Patent Application No. 102136507, filed on Oct. 9, 2013, in the Taiwan Intellectual Property Office, the content of which are hereby incorporated by reference in their entirety for all purposes.

## BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a manufacturing method and a package structure, in particular with respect to a method of manufacturing package component for light emitting diode and a package structure thereof.

2. Description of the Related Art

When facing the global energy shortage, high oil price and electricity bill, and to respond to the government's policies of energy conservation and saving energy and reducing carbon emission, power-saving lighting technology has become the mainstream, and many technique developers are engaging in developing replacement for the conventional illumination source, as well as the substitute for low power consumption. Wherein, the lighting technology of light emitting diode (LED) has become the developing product of the greatest potential in substitute illumination source.

LED has advantages of smaller volume, longer service life and lower power consumption and so on; therefore, it is commonly applied to the indicator and display of 3C products. As a result, for the sake of promoting the competitiveness of the marketing, the related industries of LED are keen on to boost the production yield rate and reduce the manufacturing cost so as to enhance the advantage themselves.

When performing the LED package manufacturing process, it usually uses methods of spraying or dispensing to directly dispose the package material to each LED, and a curing process is subsequently used to cure the package material to form the package layer so as to accomplish the conventional LED package structure. However, in steps of each spraying or dispensing, as the uncured package material is often in liquid state or gel state, the amount of the package material on the LED and the cured shape and thickness are normally not consistent with each other, it is easy to cause quality of the obtained package structure of LED not the same such that the brightness or chrominance thereof are affected. Furthermore, as LED is of directional light type, the luminous intensities of positive direction light and side direction light are different; when fluorescent substances are doped inside the package material, it is unable to make changes of the package material according to each luminous intensities of light direction (i.e. thickness), causing the problem of uneven light color of light emission and great difference of light color distribution. Consequently, as far as those industries which need to make mass production of LED package structure are concerned, it is indeed an obstacle at present.

## SUMMARY OF THE INVENTION

In view of the aforementioned technical problems of the prior art, purposes of the present invention are to provide a method of manufacturing package component for light emitting diode and a package component thereof to resolve the shortcomings of the conventional LED package manufacturing process lacking for consistent quality, as well as to promote the uniformity of light color of LED's light emission.



In order to accomplish the preceding purpose, the present invention provides a method of manufacturing package component for light emitting diode, and the method comprises: disposing at least one light emitting diode disposed on a substrate inside a photocuring resin, wherein the light emitting diode is covered completely by the substrate and the photocuring resin; providing a power to the light emitting diode to make the light emitting diode emit a plurality of light beams such that a portion of the photocuring resin is cured by the light beams to obtain a male mold; performing a separation process to separate the male mold and the other portion of the photocuring resin, the light emitting diode and the substrate; performing a rollover process to manufacture the female mold by the male mold, wherein the female mold may have at least one accommodation space with a shape identical to that of the male mold; and performing a forming process by utilizing the accommodation space to form a package component with a shape identical to that of the male mold. Wherein the forming process may comprise an injection forming process, or filling a colloid in the accommodation space of the female mold, and performing a thermal curing process or a thermoforming process to make the colloid form a package component with a shape identical to that of the male mold. Wherein a wavelength conversion material or a light scattering material is comprised inside the package component. Wherein the colloid is silica gel or epoxy resin.

According to another preferred embodiment of a method of manufacturing package component for light emitting diode of the present invention, the method further comprises performing a cleaning process to the male mold between the separation process and the rollover process to remove the residual photocuring resin on the male mold. Wherein the cleaning process utilizes an organic solvent to clean the male mold.

In addition, the present invention further provides a package structure comprising: a substrate, at least one light emitting diode disposed on the substrate, and a package component covering the light emitting diode, wherein the package component may be obtained by a method of manufacturing package component for light emitting diode according to any of the aforementioned methods. Wherein each light emission point of the plurality of light beams emitted by the light emitting diode on a surface of the package component are identical in luminous intensity.

According to another preferred embodiment of a package structure of the present invention, a package structure of the present invention further comprises an adhesive layer disposed between the light emitting diode and the package component.

In accordance with the preceding description, a method of manufacturing package component for light emitting diode and package structure thereof of the present invention may have one or more following advantages:

(1) A method of manufacturing package component for light emitting diode of the present invention is able to effectively produce package component with consistent quality so as to accomplish purpose of mass production of package components having good quality by the female mold manufactured by the male mold obtained from the light emitting diode emitting light itself In addition, according to the female mold manufactured by the male mold obtained from diverse light types of the LED emitting light itself, it can manufacture the desirable package component based on each luminous intensity of the light direction to enable the light color of the light emission being more uniform.

(2) A package structure of the present invention is obtained from a method of manufacturing package component for light emitting diode of the present invention, which is able to resolve the shortcomings of the conventional LED package manufacturing process lacking for consistent quality, as well as to promote the uniformity of light color LED's light emission so as to boost the specification of the LED package structure.

## BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a flow chart of a first preferred embodiment of a method of manufacturing package component for light emitting diode of the present invention.

FIG. **2** is a flow chart of a second preferred embodiment of a method of manufacturing package component for light emitting diode of the present invention.

FIG. **3** to FIG. **8** are schematic diagrams of operation of a method of manufacturing package component for light emitting diode of the present invention.

FIG. **9** is a schematic diagram of a first preferred embodiment of a package structure of the present invention.

FIG. **10** is a schematic diagram of a second preferred embodiment of a package structure of the present invention.

FIG. **11** is a schematic diagram of a third preferred embodiment of a method of manufacturing package component for light emitting diode of the present invention.

## DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Please refer to FIG. **1** which is a flow chart of a first preferred embodiment of a method of manufacturing package component for light emitting diode of the present invention. As shown in FIG. **1**, in the first preferred embodiment of a method of manufacturing package component for light emitting diode of the present invention, the method of manufacturing package component for light emitting diode at least comprises steps of: S**10**, S**20**, S**30**, S**40** and S**50**. In step S**10**: disposing at least one light emitting diode disposed on a substrate inside a photocuring resin, wherein the light emitting diode is covered completely by the substrate and the photocuring resin; in step S**20**: providing a power to the light emitting diode to make the light emit diode emit a plurality of light beams such that a portion of the photocuring resin is cured by the light beams to obtain a male mold; in step S**30**: performing a separation process to separate the male mold and the other portion of the photocuring resin, the light emitting diode and the substrate; in step S**40**: performing a rollover process to manufacture the female mold by the male mold, wherein the female mold has at least one accommodation space with a shape identical to that of the male mold; and in step S**50**: performing a forming process by utilizing the accommodation space to form a package component with a shape identical to that of the male mold. Wherein the forming process may comprise, for example, an injection forming process to form a package component with a shape identical to that of the male mold; or filling a colloid in the accommodation space of the female mold, and performing a thermal curing process or a thermoforming process to make the colloid form a package component with a shape identical to that of the male mold, but it shall not be subject to this restriction. Any forming processes which are able to form a package component with a shape identical to that of a male mold by utilizing an accommodation space belongs to the protected scope claimed by the present invention.

Please refer to FIG. **2** which is a flow chart of a second preferred embodiment of a method of manufacturing package component for light emitting diode of the present invention. As shown in FIG. **2**, in the second preferred embodiment of a method of manufacturing package component for light emitting diode of the present invention, the method of manufacturing package component for light emitting diode at least comprises steps of: S **10**, S**20**, S**30**, S**40**, S**50** and S**60**. The difference between the first and the second preferred embodiments of a method of manufacturing package component for light emitting diode of the present invention merely is: in the second preferred embodiment, the method further comprises performing a cleaning process S**60** to the male mold between the separation process and the rollover process to remove the residual photocuring resin on the male mold. In step S**60**: the cleaning process utilizes, for example, an organic solvent to clean the male mold. Wherein, the organic solvent may be, for example, acetone, but it shall not be subject to this restriction. Any solvents or solutions which are able to resolve or remove the residual photocuring resin on the male mold belongs to the protected scope claimed by the present invention.

With respect to steps S**10**, S**20**, S**30**, S**40** and S**50** stated in the first and the second preferred embodiments of a method of manufacturing package component for light emitting diode of the present invention, please refer to FIG. **3** to FIG. **8** simultaneously for the clear explanations.

FIG. **3** to FIG. **8** are schematic diagrams of operation of a method of manufacturing package component for light emitting diode of the present invention. Firstly, as shown in FIG. **3**, an accommodation tank **10** is provided, and a photocuring resin **20** is disposed in the accommodation tank **10**, and then disposing at least one light emitting diode **40** disposed on a substrate **30** inside a photocuring resin **20** (step S**10**) such that the light emitting diode **40** is covered completely by the substrate **30** and the photocuring resin **20**. In addition, a power supply unit **50** is further provided to electrically connect with the light emitting diode **40**. The power supply unit **50** is, for example, electrically connected to substrate **30**, and the substrate **30** is electrically connected to the light emitting diode **40**, but it shall not be subject to this restriction. Wherein, the photocuring resin **20** can be UV resin or visible light resin, but it shall not be subject to this restriction. User can choose a photocuring resin based on light beam's wavelength emitted by a light emitting diode. Any resin materials which are able to cure light beams emitted by a light emitting diode belongs to the protected scope claimed by the present invention.

Subsequently, please refer to FIG. **4** which demonstrates providing a power to the light emitting diode **40** to make the light emitting diode **40** emit a plurality of light beams L (step S**20**) such that a portion of the photocuring resin **20** is cured by the light beams L. Wherein, period of the portion of the photocuring resin **20** being cured by the light beams L can be, for example, within a range between **1** sec and **70** sec. Namely, after the light emitting diode **40** emitting light beams L by about 1 sec to 70 sec, a portion of the photocuring resin **20** is totally cured into a solid state from a gel state (or liquid state) to become the male mold **22**. In addition, as shown in FIG. **4**, the light emitting diode **40** has a upper surface **401** away from the substrate **30**, a plurality of side surfaces **402** connecting with the upper surface **401** and a lower surface **403** connecting with the side surfaces **402** and the substrate **30**; besides, as the light emitting diode **40** has directivity when emitting light beams, among the light beams L emitted by the light emitting diode **40**, the luminous intensity of the light beams L**1** emitted from the upper surface **401** is greater than that of the light beams L**2** emitted from the side surfaces **402**.

After a portion of the photocuring resin **20** is totally cured into a solid state from a gel state (or liquid state) to become the male mold **22**, step S**30** is conducting to perform a separation process so as to separate the male mold **22** and the other portion **24** of the photocuring resin **20**, the light emitting diode **40** and the substrate **30**. As shown in FIG. **5**, the obtained male mold **22** by the step S**30** has a top portion **221** and a side portion **222**. In this embodiment, among the light beams L emitted by the light emitting diode **40**, as the luminous intensity of the light beams L**1** emitted from the upper surface **401** is greater than that of the light beams L**2** emitted from the side surfaces **402** (as shown in FIG. **4**), thickness of the top portion **221** of the male mold **22** is greater than that of the side portion **222** of the male mold **22**, and as each light direction intensity of the light emitting diode **40** is not the same with each other, the formed surface of the male mold **22** is slightly unsmooth. Because light emitting types of various light emitting diodes are not consistent with each other, shape of the male mold **22** is different from each other due to the intensity of the light irradiation, but it shall not be subject to this restriction. After S**30** is completed, the cleaning process S**60** is further performed to remove the residual photocuring resin which is uncured on the male mold **22** (refer to FIG. **2**). Wherein, an organic solvent, such as acetone can be used to clean the male mold **22** in step S**60**.

Next, as shown in FIG. **6** and FIG. **7**, a rollover process (S**40**) is performed to manufacture the female mold by the male mold **22**. The rollover process is to provide a accommodation tank **52**, and a female mold material **60** is disposed in the accommodation tank **52**, and then disposing the male mold **22** inside the female mold material **60**, and separating the female mold **62** and the male mold **22** after the female mold material **60** is cured to form the female mold **62**. The rollover process can use an injection forming process to form the female mold **62**, but it shall not be subject to this restriction. Please refer to FIG. **7**, and as shown in the FIG. **7**, the female mold **62** has one accommodation space S with a shape identical to that of the male mold **22**. It can, of course, form multiple accommodation spaces S with a shape identical to that of the male mold **22** on the same female mold **62** depending on the situations to save manufacture cost for the follow-up steps and the time. Moreover, performing a forming process (step S**50**) to form a package component **70** with a shape identical to that of the male mold **22** by utilizing the accommodation space S. Wherein, the forming process can be such as an injection forming process, or filling a colloid in the accommodation space S of the female mold **62**, and performing a thermal curing process or a thermoforming process to make the colloid form the package component **70** with a shape identical to that of the male mold **22**, but it shall not be subject to this restriction. Wherein, the colloid is silica gel or epoxy resin for instance, but it shall not be subject to this restriction. Wherein, the period of the forming process can be such as with a range between half hour and 5 hours. The package component **70** obtained from a method of manufacturing package component for light emitting diode of the present invention can be seen in FIG. **8**, and an additive material **72** is further comprised inside the package component **70** according to the needs, such as a wavelength conversion material or a light scattering material to change physical feature (i.e. wavelength or scattering property) of the package component **70** which is penetrated by light beams. Wherein, the wavelength conversion material or the light scattering material is mixed to add in the forming process; such as being mixed to add in the colloid and then to be cured and form the package component **70**, but it shall not be subject to this restriction.

A method of manufacturing package component for light emitting diode of the present invention is to obtain the male mold **22** by the light emitting diode **40** emitting light beams itself, and to manufacture the female mold **62** by the male mold **22**, and then the female mold **62** is used to manufacture the multiple package components **70** of consistent quality. Therefore, the size (i.e. thickness or size) and physical feature of the obtained multiple package components **70** are both the same, and the technical problem of the package component obtained from the conventional LED manufacturing process lacking for consistent quality is thereby solved. Moreover, as the light types emitted by diverse LEDs are not the same with each other, using the conventional package method is possible to cause problem concerning that the light beams of different light directions penetrated by the package component have uneven light color of light emission and great difference of the light color distribution. Using a method of manufacturing package component for light emitting diode of the present invention is to manufacture the female mold by the male mold obtained from the light type of the LED emitting light beams itself, and the necessary package component obtained from every light direction's luminous intensity has a thicker light direction thickness in light intensity and a weaker light direction thickness in disphotic so that the light color of light beams becomes more uniform.

Please refer to FIG. **9** which is a schematic diagram of a first preferred embodiment of a package structure of the present invention. As shown in FIG. **9**, in the first preferred embodiment of a package structure of the present invention, the package structure comprises a substrate **32**, at least one light emitting diode **42** disposed on the substrate **32**, and a package component **70** covering the light emitting diode **42**. Wherein, the package component **70** is obtained by the first or the second preferred embodiment of a method of manufacturing package component for light emitting diode according to any of aforementioned methods. Wherein, each light emission point of the plurality of light beams emitted by the light emitting diode **42** on a surface of the package component **70** are identical in luminous intensity; that is to say, after the emitted light from the light emitting diode **42** passing through the package component **70**, each light emission point of each light direction is uniform. In addition, if a wavelength conversion material is added in the package component **70**, the package component **70** is a wavelength conversion component having wavelength conversion function. For example, if yellow fluorescent powder is added into the package component **70** and the light emitting diode **42** is a light emitting diode emitting blue light, when the light beams passing through the package component **70** activate the yellow fluorescent powder, the package structure emits white light. Because the package component **70** of the present invention is manufactured based on the luminous intensity of each light direction, optimizing the uniformity of the white light is more applicable to be applied to illumination lamps such as light bulb and so on.

In addition, as shown in FIG. **10**, in the second preferred embodiment of a package structure of the present invention, the package structure of the present invention further comprises an adhesive layer **80** disposed between the light emitting diode **42** and the package component **70**, and the adhesion of the adhesive layer **80** is used to fix the package component **70** on the light emitting diode **42**. Wherein, the material of the adhesive layer **80** can be such as silica gel or epoxy resin, but it shall not be subject to this restriction. Any materials which are able to provide adhesion to the adhesive layer **80** belongs to the protected scope claimed in the present invention.

Please refer to FIG. **11** which is a schematic diagram of a third preferred embodiment of a method of manufacturing package component for light emitting diode of the present invention. Besides the preceding FIG. **4** demonstration, a user is able to dispose more than two light emitting diodes **40** on the substrate **30** based on the practical needs (amount of the light emitting diode **40** in the embodiment is two, but it shall not be subject to this restriction), and dispose these light emitting diodes **40** along with the substrate **30** inside the photocuring resin **20**. When the power supply unit **50** provides a power to the light emitting diodes **40** to make the light emitting diodes emit the light beams L such that a portion of the photocuring resin **20** is cured by the light beams L to obtain a male mold **22**. As shown in FIG. **11**, as the light beams emitted from the two adjacent light emitting diodes **40** may simultaneously irradiate on area A of the photocuring resin **20**, enabling that the light beams L irradiating the area A have additive property so as to be cured to form the male mold **22** as shown in FIG. **11**. It not only can perform the package manufacturing process without aiming to each of different light emitting diodes **40** to reduce the processing time and cost, but also enable the light color of each light direction emitted from the multiple light emitting diodes **40** packaged on the same substrate **30** becoming more uniform and even through manufacturing the female mold by the male mold **22** obtained from the light type emitted from more than two light emitting diodes **40** and using the female mold to manufacture suitable package component. Besides this, the user is further able to adjust a distance between the two adjacent light emitting diodes **40** based on the practical needs so as to manufacture the continuous male mold **22** having the area A (shown in FIG. **11**) or discontinuous male mold **22** without the area A (not shown in FIGS.).

In conclusion, a method of manufacturing package component for light emitting diode and a package structure thereof of the present invention is able to produce package components of consistent quality by the female mold manufactured by the male mold obtained from the light emitting diode emitting light itself so as to resolve technical problem concerning that the conventional LED package manufacturing process is lacking in consistent quality, as well as to promote the specification for the LED package structure such that the package components having excellent quality can be massively produced under the process conditions of high efficiency and low cost. In addition, manufacturing the female mold by the male mold obtained from the light type emitted from various LEDs, it can manufacture the necessary package component aiming to the luminous intensity of each light direction to make the light emission become more even.

While the means of specific embodiments in present invention has been described by reference drawings, numerous modifications and variations could be made thereto by those skilled in the art without departing from the scope and spirit of the invention set forth in the claims. The modifications and variations should in a range limited by the specification of the present invention.

What is claimed is:

**1**. A method of manufacturing package component for light emitting diode, comprising:

disposing at least one light emitting diode disposed on a substrate inside a photocuring resin, wherein the light emitting diode is covered completely by the substrate and the photocuring resin;

providing a power to the light emitting diode to make the light emitting diode emit a plurality of light beams such that a portion of the photocuring resin is cured by the light beams to obtain a male mold;

performing a separation process to separate the male mold and the other portion of the photocuring resin, the light emitting diode and the substrate;

performing a rollover process to manufacture the female mold by the male mold, wherein the female mold has at least one accommodation space with a shape identical to that of the male mold; and

performing a forming process by utilizing the accommodation space to form a package component with a shape identical to that of the male mold.

**2**. The method of manufacturing package component for light emitting diode of claim **1**, wherein the forming process comprises an injection forming process.

**3**. The method of manufacturing package component for light emitting diode of claim **1**, wherein the forming process comprises:

filling a colloid in the accommodation space of the female mold, and

performing a thermal curing process or a thermoforming process to make the colloid form a package component with a shape identical to that of the male mold.

**4**. The method of manufacturing package component for light emitting diode of claim **1**, wherein a wavelength conversion material is comprised inside the package component.

**5**. The method of manufacturing package component for light emitting diode of claim **1**, wherein a light scattering material is comprised inside the package component.

**6**. The method of manufacturing package component for light emitting diode of claim **3**, wherein the colloid is silica gel or epoxy resin.

**7**. The method of manufacturing package component for light emitting diode of claim **1**, further comprising performing a cleaning process to the male mold between the separation process and the rollover process to remove the residual photocuring resin on the male mold.

**8**. The method of manufacturing package component for light emitting diode of claim **7**, wherein the cleaning process utilizes an organic solvent to clean the male mold.

**9**. A package structure, comprising:

a substrate,

at least one light emitting diode disposed on the substrate, and

a package component covering the light emitting diode, wherein the package component is obtained by a method of manufacturing package component for light emitting diode according to claim **1**.

**10**. The package structure of claim **9**, wherein each light emission point of the plurality of light beams emitted by the light emitting diode on a surface of the package component are identical in luminous intensity.

**11**. The package structure of claim **9**, further comprising an adhesive layer disposed between the light emitting diode and the package component.

**12**. A package structure, comprising:

a substrate,

at least one light emitting diode disposed on the substrate, and

a package component covering the light emitting diode, wherein the package component is obtained by a method of manufacturing package component for light emitting diode according to claim **4**.

**13**. The package structure of claim **12**, wherein each light emission point of the plurality of light beams emitted by the light emitting diode on a surface of the package component are identical in luminous intensity.

**14**. The package structure of claim **12**, further comprising an adhesive layer disposed between the light emitting diode and the package component.

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